

**REMARKS**

Reconsideration of the application is requested in view of the remarks below.

**Rejection Under 35 USC 102**

The Office Action rejected Claims 10-14 on the grounds that they were clearly anticipated by XP-000874467 (Alonso). The rejection should be withdrawn in view of the remarks below. It is well settled that in order for a prior art reference to anticipate a claim, the reference must disclose each and every element of claim with sufficient clarity to prove its existence in the prior art. The disclosure requirement under 35 USC 102 presupposes knowledge of one skilled in the art of claimed invention, but such presumed knowledge does not grant license to read into prior art reference teachings that are not there. See Motorola Inc. v. Interdigital Technology Corp. 43 USPQ2d 1481 (1997 CAFC). It is also well-established that a 35 USC 102 rejection must rest upon the literal teachings of the reference and that the teachings must disclose every element of the claimed invention in as complete detail as is contained in the claim (See. *Jamesbury Corp v. Litton Industrial Products, Inc.* 225 USPQ, 253, 256 (CAFC 1985); *Kalman v. Kimberly-Clark Corp* 218 USPQ 781, 789 (Fed. Cir. 1983)).

Applicants' invention relates to a process that makes a tungsten carbide. The process involves gas phase carburization of tungsten powders and/or suitable tungsten precursor compound powders at a temperature ranging from 850°C to 950°C, such that the carburizing gas phase used is a CO<sub>2</sub>/CO mixture. The CO<sub>2</sub> content is above the Boudouard equilibrium content corresponding to the carburization temperature. The carburization is carried out with a carbon activity ranging from 0.4 to less than 1. In one embodiment, the carburization is carried out with a carbon activity from 0.4 to 0.9. In another embodiment, the carburization temperature ranges from 900°C to 950°C. In another embodiment, the carburization is carried out at carburization temperature over a period from 4 to 10 hours.

Alonso discloses the production of tungsten carbide (WC) from tungsten trioxide (WO<sub>3</sub>) by means of CO-CO<sub>2</sub> mixtures (61, 78 and 100% v/v CO) in the temperature interval ranging from 700°C to 1100°C (See Abstract). Alonso discloses that between 700 and 800°C, the process was controlled by the nucleation and

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growth of the lower oxide  $W_{20}O_{58}$ , whereas between 800 and 1100°C the process was controlled by the elementary reaction  $WO_2 \rightarrow W$ . Alonso discloses that a second order dependence of the initial rate constant with respect to partial CO pressure was estimated. The thermomechanical data used for the W-C-O system were consistent with the experimental results. Alonso concluded that the most appropriate conditions for the reduction-carburization of tungsten trioxide by means of carbon monoxide-carbon dioxide mixtures were a temperature of 900°C, a gaseous mixture composition of 100% v/v CO, a volumetric flow rate of 1450 ml (STP)/min and a time of 6 hours. Under these conditions, according to Alonso, a tungsten carbide powder with an average particle diameter of 0.40  $\mu m$  was obtained.

Alonso does not anticipate Applicants' invention. The Office Action's statement that ".....Alonso et al do not teach that the carbon activity is between 0.4 to less than 1" supports Applicants' arguments that Alonso does not anticipate Applicants' invention. Indeed, since Alonso does not disclose a process in which the carburization is carried out with a carbon activity ranging from 0.4 to less than 1, Alonso does not meet a limitation of Claims 10-14. As such, since Alonso does not disclose each and every element of the invention encompassed by Claims 1-14, Alonso does not place Applicants' invention in the possession of the public more than one year before the priority date of this application. Reconsideration is requested.

The Office Action stated that "The specific examples disclosed by Alonso et al have carbon activities, calculated from Applicant's formula on page 3 of the specification that are 0.026 (61 wt% CO), 0.077 (78 wt% CO) and essentially infinity (100 wt% CO)." Such statement does not support the rejection under 35 USC 102. Alonso discloses gas-phase carburization of tungsten trioxide using CO as well as using  $CO_2/CO$  mixtures at a temperature of 900°C. The mixtures disclosed by Alonso contain 78 and 61% by volume of CO, respectively. At a temperature of 900°C, such contents correspond to a carbon activity of 0.077 and 0.026, respectively. These levels are significantly outside the range required by Applicants' invention, in which carburization is carried out with a carbon activity of at least 0.4. With respect to the Alonso process in which 100% CO gas is used (no  $CO_2$  gas is used), Alonso fails to teach the use of a  $CO_2/CO$  mixture, as claimed by Applicants.

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Alonso simply does not disclose each and every element of new Claims 10-14 with sufficient clarity to prove Applicants' invention existed in the prior art. Reconsideration is requested.

The Office Action's reliance on *In re Aller* 104 USPQ 233 (CCPA 1955) is not on point. First, Alonso does not contain any teaching that practicing Applicants' process would be within routine experimentation. Second, the Office Action's discussion about unexpected results applies to rejections under 35 USC 103 and does not apply to rejections under 35 USC 102. Under 35 USC 102, it is clear and well established that literal teachings of a reference must disclose every element of the claimed invention in as complete detail as is contained in the claim. (See MPEP 2131). Alonso does not disclose each and every element of the invention encompassed by Claims 1-14 and does not place Applicants' invention in the possession of the public more than one year before the priority date of this application. Reconsideration is requested.

#### **Rejection Under 35 USC 103**

The Office Action rejected Claim 15 under 35 USC 103 over Alonso in view of FR 2 294 133 (FR '133). The rejection should be withdrawn. It is well settled that to establish a *prima facie* case of obviousness, the USPTO must satisfy all of the following requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references. *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the proposed modification must have had a reasonable expectation of success, as determined from the vantage point of one of ordinary skill in the art at the time the invention was made. *Amgen v. Chugai Pharmaceutical Co.* 18 USPQ 2d 1016, 1023 (Fed Cir, 1991), cert. denied 502 U.S. 856 (1991). Third, the prior art reference or combination of references must teach or suggest all of the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496, (CCPA 1970). The Office Action did not establish a *prima facie* case of obviousness.

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Applicants' invention, as encompassed by Claim 15, relates to a process that subjects the tungsten carbide made by the process according to Claim 10 to a heat treatment at a temperature ranging from 1,150°C to 1,800°C after carburization.

FR '133 teaches obtaining WC by treating finely divided  $WO_3$  with CO at a temperature at which no agglomeration or sintering action takes place to effect the following reaction  $WO_3 + 5CO \rightarrow WC + 4CO_2$ .

One of ordinary skill in the art following the teachings of Alonso, singly or in combination with FR '133 would not have been motivated to modify Alonso, practice Applicants' invention and expect the results Applicants' have obtained. Alonso teaches gas-phase carburization of tungsten trioxide using CO or a mixture of CO and  $CO_2$  having a very low carbon activity. On page 150, 2nd paragraph, Alonso concludes that the most appropriate conditions for the reduction-carburization of tungsten trioxide include using CO without any  $CO_2$  present (gaseous mixture composition = 100% v/v carbon monoxide). FR '133 teachings that WC can be obtained by treating finely divided  $WO_3$  with CO at a temperature at which no agglomeration or sintering action takes place to effect the following reaction  $WO_3 + 5CO \rightarrow WC + 4CO_2$ , fails to provide any teaching that would have motivated Alonso to modify Alonso, practice Applicants' invention and expect the results Applicants' have obtained. As such, Alonso would have clearly taught away from Applicants' invention, in which carburization is carried out with a mixture containing both CO as well as  $CO_2$  and having a high carbon activity (at least 0.4). Reconsideration is requested.

An object of Applicants' invention is to provide a process for the carburization of tungsten powders or tungsten precursor powders, which allows fast and complete carburization and, on the other hand, ensures that deposition of free carbon on the produced tungsten carbide is avoided (See page 2, lines 21-29). Applicants' process achieves this object by carrying out carburization with a  $CO_2/CO$ -mixture and working at a certain temperature and a certain carbon activity. Alonso recommends using solely CO, and thereby encourages the avoidance of mixtures of CO and  $CO_2$ . As such, Alonso, singly or in combination with FR '133, does not render obvious Applicants' claimed process. Reconsideration is requested.

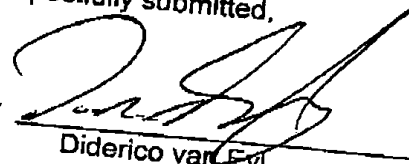
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One of ordinary skill in the art following Alonso, singly or in combination with FR '133, would not have expected benefits Applicants have obtained. Alonso does not teach performing a heat treatment step after carburization. One of ordinary skill in the art would have expected that heat treatment at temperatures higher than the temperature of carburization would result in an increase of particle size of the WC-powder. In case such a powder is used to produce a liquid-phase sintered composite material, e.g. WC-Co, the degree of dispersion of the WC-phase, and hence, the hardness of the composite material would be expected to decrease. Surprisingly, Applicants discovered that that is not the case. By contrast, hardness increase (See Table 2, Example 1 (no heat treatment) vs. Examples 2, 3 and 5 (heat treatment)) is observed. As such, one of ordinary skill in the art following Alonso would not have expected benefits Applicants have discovered. Reconsideration is requested.

In view of the foregoing amendments and remarks, allowance of new Claims 10-15 is earnestly requested.

Respectfully submitted,

By



Diderico van Eyl  
Attorney for Applicants  
Reg. No. 38,641

Bayer Corporation  
100 Bayer Road  
Pittsburgh, Pennsylvania 15205-9741  
PHONE: (412) 777-8355  
FACSIMILE PHONE NUMBER:  
412-777-8363

s:/sr/dve0523

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